2. Overview on Albanian nature

2.1. Geography

The terrain of Albania is characterized by very diverse topographic textures (Fig. 2-1), with flat lowlands in the West and mountains in the East. The altitude increases gradually from West to East. Plains cover about 15% of the surface area, mainly in the West of the country, with hills of altitudes up to about 200 m a.s.l. In some places, the mountains are radially grouped as in the Albanian Alps or they form regularly oriented chains oriented mainly from the South-East to the North-West. In general, the mountains have steep slopes and flat crests, with steeper slopes in the Western region than in the Eastern part. Deep valleys often squeeze through narrow gorges forming canyons such as the Kelcyra Gorge (Permeti), one of the biggest in Albania. There the Vjosa River flows towards the Western Lowland. Karst formations are evident all over the country, from the sea level up to the high altitudes. Karst topography is more pronounced at higher altitudes. Permanent ice is limited to mountain peaks higher than 1800 m a.s.l.

The climate is mainly of a Mediterranean subtropical character with high humidity (Tab. 2-1 and 2-2; Fig. 2-2); in the North and East it gradually varies to a moderate continental climate. Typically, the winter is relatively short, mild and wet, while the summer is long, hot and very dry. Precipitation is heavy, ranging from about 1300 mm per year in Saranda to 2000 mm per year in Shkodra, increasing from West to East. As a result of sudden strong rain events, brooks and torrents often develop with extreme erosion capacity. The number of sunny hours is high (Tab. 2-1); e.g. Tirana gets more than 330 sunny days per year yielding more than 2100 kWh $m^{-2}year^{-1}$ (Tab. 2-2).

Table 2-1: Climate data for Albania
(*http://www.lexas.net/laender/europa/albanien/klima.asp*).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average low, °C	2	2	5	8	12	16	17	17	14	10	8	5
Average high, °C	12	12	15	18	23	28	31	31	27	23	17	14
Humidity, %	71	69	68	69	70	62	57	57	64	67	75	73
Sunshine, *h day*$^{-1}$	4	4	5	7	8	10	12	11	9	7	3	3
Precipitation, *day*	13	13	14	13	12	7	5	4	6	9	16	17

Albanian geology shows multifaceted rock formations, some dating back to the Paleozoic period, with sedimentary and volcanic formations being the most dominant. Jurassic limestone forms the main chains of the mountains and the gorges, whereas Cretaceous limestone is found in the plains. Ophiolithic formations are the largest in the whole Alpine-Mediterranean belt. In the Eastern part alkaline rock formations (serpentine, dunite, olivinite) contain relatively high concentrations of heavy metals (manganese, chromium, cobalt, copper, zinc). In contrast the Adriatic Lowland is composed of Quaternary depositions of marine, lagoon and alluvial origin.

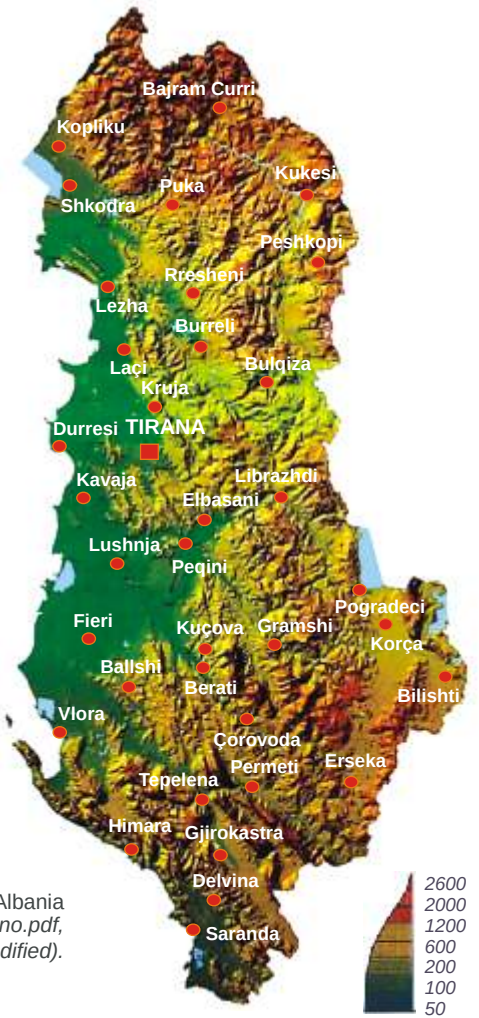

Figure 2-1: Geographical map of Albania *(http://www.cismalbania.it/download/21_ Pano.pdf, modified).*

Table 2-2: Climate data for Tirana - Tirana has a Mediterranean climate (Fig. 2-2), with hot and moderately dry summers, and cool and wet winters (BBC Weather Service: Tirana; http://en.wikipedia.org/wiki/Tirana).

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high temperatures, °C	19	22	26	28	33	37	38	40	35	31	25	22	40
Average high temperatures, °C	12	12	15	18	23	28	31	31	27	23	17	14	20.9
Average low temperatures, °C	2	2	5	8	12	16	17	17	14	10	8	5	9.7
Record low temperatures, °C	- 8	- 8	- 4	- 1	3	6	11	10	5	1	- 3	- 7	- 8
Precipitation, mm	135	152	128	117	122	86	32	32	60	105	211	173	1‘353
Average precipitation days (>/= 0.1 mm)	13	13	14	13	12	7	5	4	6	9	16	16	128
Mean monthly sunshine hours	124	113	155	210	248	300	341	341	270	217	90	62	2‘471

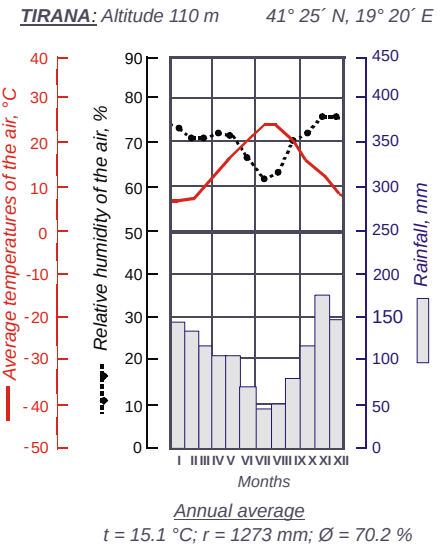

Figure 2-2: Climate diagram of Tirana based on the average values of the years (1951 to 1980) (Kabo, 1990).

In the Lowlands the soil is gray brown, influenced by the Mediterranean climate with rainfall between 900 and 1800 mm per year and encompassing rock formations composed of limestone, clay, sand and conglomerates. In the central and the Eastern part of the country, up to altitudes of 600 to 1000 m a.s.l., the brown mountainous soil (on more than 38% of the area) is most abundant. The soil composition, with a low content of organic matter and a meager depth, together with the mountainous terrain and Mediterranean climate, with annual precipitations ranging from 1500 to 2000 mm, makes most parts of the Albanian territory very sensitive to erosion.

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Figure 2-3: ***Left:*** Upper part of the Vjosa River valley in Çarshova (Permeti); ***right:*** Shala River and Albanian Alps in Thethi NP (Shkodra) (Photos: A. Miho and L. Shuka).

Figure 2-4: Albanian tulip, *Tulipa albanica (Liliaceae)*, described recently as a new species from North-eastern Albania (Shuka *et al*., 2010) (Photo: L. Shuka).

Appropriate management of the vegetation cover with shrubs and forests is indispensable for soil protection, to prevent erosion and to maintain the quality of rivers and transitional waters.

Lowland soils allow typical Mediterranean shrubs Oriental hornbeam, strawberry tree and others and trees like ash or oak to grow. Both soil composition and climate are also very favorable for rich and efficient farming.

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2.2. The Albanian flora and vegetation

The spatial variation and temporal density and diversity of plant species are determined by the environmental conditions present, such as climate, geology and topography, and by the natural dynamics and successions as well as by biological interactions and human activities. The favorable climate in Albania with heavy rainfall, variable terrain with high mountains and deep valleys, marshland and coastal transitional zones supports diversity of habitats and facilitates a rich plant and animal diversity. Although Albania is a small country, it shelters a wealth of aquatic ecosystems including, marine and coastal zones, lagoons, estuaries, rivers, springs, karstic and glacial lakes., Terrestrial ecosystem include Mediterranean evergreen and deciduous shrubs, deciduous and pine forests, alpine and sub-alpine pastures and meadows and high mountainous regions.

Forests and pastures cover about 36% and 15% of the territory, respectively, most of them of alpine and sub-alpine character. They are important shelters for many plant and animal species. According to a recent census, 45 sites in the country are considered as Important Plant Areas (IPAs), comprising a total surface area of about 3850 km^2. Within these areas there are about 144 endangered habitats and 44 habitats are rich in plant species. Considering the most recent publications, there are about 3500 higher plant species in Albania, equal to about 30% of the sum of species in Europe (Tab. 2-3), and about 2350 species of known lower plants including mosses, macroalgae and fungi. Albania has also a significant agriculture-related genetic diversity with about 30 species of food plants native in the country (NEA/AKM, 1999).

Table 2-3: The number of vascular plant species per 1000 km^2 is much higher in Albania compared with other states, Europe or terrestrial ecosystems *(http://ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European_vascular_plants.pdf; http://en.wikipedia.org/wiki/Terrestrial_ecosystem).*

Continents, regions or states	Surface km^2	*Number of species*	*Species per 1000 km^2*
Europe	10´400´000	25´000	*2.4*
Terrestrial ecosystems (28%)	144'150'000	299´500	*2.1*
Albania	**28´000**	***3´500***	***125***

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Figure 2-5: Habitats with two perennial plants, evergreen xerophytic subshrubs of economic importance and endangered. ***Left:*** Sage (Salvia officinalis), from Bovilla (Tirana); ***right:*** Mountain tea (*Sideritis raeseri*) from Nemerçka mountain (Gjirokastra) (Photos: A. Miho and L. Shuka).

About 30 plant species are considered as Albanian endemics, while another 160 species are endemic to Albania and adjacent countries. Albania's Red Book lists 320 species of flowering plants, 45 fungal species and 25 marine plants as endangered or rare (Fig. 2-5).

About 25% of the flowering plants belong to the Mediterranean flora, most of them evolved during the Tertiary (Miocene) period. Species like *Aesculus hippocastanum, Dioscorea balcanica, Dryas octopetala, Forsythia europaea, Gymnospermium scipetarum, Narthecium scardicum, Pinus heldreichii, Ramonda serbica, Salix reticulata* and *S. retusa* and *Wulfenia baldaccii* are considered relicts of the Tertiary period (Fig. 2-6). In contrast *Aster albanicus* ssp. *paparistoi, Acis ionica (=Leucojum valentinum* ssp. *vlorense), Carex markgrafii, Centaurea candelabrum* and *C. kosaninii, Crepis bertiscea, Lunaria telekiana, Petasites doerfleri, Ranunculus degenii, R. hayekii, Sanguisorba albanica* are neo-endemics or subendemics. Among the most important endemics are also *Acantholimon albanicum, Astragalus autrani, Cistus albanicus (subendemic), Gymnospermium maloi, Hypericum haplophylloides* (ssp. *haplophylloides* and ssp. *devollense), Tulipa albanica* and *Wulfenia baldaccii* (Figs. 2-4 and 2-6).

Albanian vegetation shows an intermixture of Mediterranean and Central European vegetation, depending on the orientation of the main mountain chains. Mediterranean vegetation dominates in the South-west and gradually diminishes towards the North-east, where it becomes substituted by the European vegetation. Coastal vegetation often penetrates eastward in river valleys.

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Figure 2-6: Rare species from the Albanian flora: **1:** *Paramoltkea doerfleri* (Kolsh, Kukesi); **2:** *Centaurea kosanini* (Pashtriku, Kukesi); **3:** *Wulfenia baldaccii* (Thethi, Shkodra); **4:** *Hypericum haplophylloides* (Llogora, Vlora); **5:** *Dioscorea balcanica* (Kolsh, Kukesi); **6:** *Acantholimon albanicum* (Boboshtice, Korça); **7:** *Forsythia europaea* (Mati); **8:** *Gymnospermium maloi* (Picari, Gjirokastra); **9:** *Lilium albanicum* (Kallabaku, Kukesi) (Photos: L. Kashta and L. Shuka).

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Table 2-4: Common plant species in the Mediterranean shrubs and forests.		
Scientific name	**Common name**	**Albanian name**
Arbutus unedo	Strawberry tree	Mareja
Erica arborea	Tree heath	Shqopa
Myrtus communis	True myrtle	Mersina
Phillyrea spp.	Narrow leaf philly rea, False olive	Mretja, Krifsha
Pistacia lentiscus	Mastic tree	Xina, Bafra, Sqindi
Quercus coccifera	Kermes oak	Prralli, Ngasja
Quercus pubescens	Pubescent oak	Bungebuta, Lisi i bute
Smilax aspera	Common smilax	Urthi
Spartium junceum	Spanish broom	Xana, Gjineshtra

Typically, Albanian vegetation is structured in vertical belts; Mediterranean shrubs and forests are found alongside belts of oaks, beech and the alpine pastures. The belt of Mediterranean shrubs and forests is the most extended one; it covers about 40% of Albanian territory. It is present in Lowlands and, depending on the climate, ranges from the Western coast to altitudes of 400 to 1000 m a.s.l. The vegetation consists mainly of evergreen shrubs blended with some deciduous shrubs. Along the Adriatic coast Mediterranean pine forests and evergreen Mediterranean shrubs or maquis thrive (Tab. 2-4).

In the southern coastal mountain region, large areas of dry stony pastures spread with special associations of deciduous shrubs (Tab. 2-5).

Table 2-5: Common plant species in the dry stony pastures and deciduous shrubs.			
Scientific name	**Common name**	**Albanian name**	**Notes**
Buxus sempervirens	Common box	Bushi	
Cistus incanus	Rock rose	Menishtja	
Euphorbia dendroides	Tree spurge	Druri i qumeshtores	In Shengjini, Himara and Ksamili
Juniperus oxycedrus	Prickly juniper	Dellinja e kuqe	
Nerium oleander	Oleander	Lenadri	Only at the Ionian coast (Himara)
Phlomis fruticosa	Jerusalem sage	Cfaka, Bexga	
Pistacia terebinthus	Terebinth, Turpentine tree, Pistache	Bafra, Qelbesi	In Delvina Lowland
Punica granatum	Wild pomegranate	Shega	In the hilly slopes from Miloti to Hoti (Kopliku)
Quercus macrolepis	Vallonea oak	Valanidhi	At the Ionian Riviera
Salvia officinalis	Common sage	Sherbela	
Spartium junceum	Spanish broom	Gjineshtra	Along the coast

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In large areas along coastal lagoons and in channels, ponds or freshwater marshes, reed beds flourish (Tab. 2-6), while the bottom of the lagoons is usually covered by submersed plants (Tab. 2-7). In coastal wetlands and dunes various halophytes, psamophytes and other brackish and freshwater associations are present (Tab. 2-8).

Table 2-6: Common plant species in the coastal lagoons, in channels, ponds or freshwater marshes.

Scientific name	Common name	Albanian name
Alisma plantago-aquatica	Common water-plantain	Kelkoja e ujit
Arthrocnemum glaucum	Salicornia	Artroknemi i rimte
Carex spp.	Sedge	Presja
Inula crithmoides	Golden samphire	Omani kritmoid
Iris pseudacorus	Yellow iris	Badra e ujit
Juncus spp.	Rush	Kulmaku, Zhuka
Mentha aquatica	Water mint	Mendra e ujit
Phragmites australis	Common reed	Kallamishte
Scirpus spp.	Club-rush	Shqirra
Tamarix spp.	Tamarisks	Marina
Typha latifolia	Reed-mace	Shavari, Rogozi
Veronica beccabunga	Brooklime	Veronika bekabunge
Vitex agnus-castus	Chaste tree	Konopica

Table 2-7: Submersed plants in the coastal wetlands and lagoons.

Scientific name	Common name	Albanian name	Notes
Macrophyte algae:			
Ulva spp.	Sea lettuce	Sallata e detit	In coastal marine habitats
Chaetomorpha linum	Green hairweed	Ketomorfa	
Cladophora sp.		Kladofora	In rivers
Enteromorpha (Ulva) intestinalis	Grass kelp	Enteromorfa	In coastal marine habitats
Gracillaria spp.	Red seaweed	Gracilaria	
Higher plants:			
Potamogeton spp.	Pondweed	Potamogeton	In rivers and littoral parts with less salinity
Ruppia cirrhosa	Spiral ditchgrass	Rupia	In calm and shallow water
Zostera noltii	Eelgrass	Zostera, Leshteriku	Covers about 40-50% of the submersed prairies
Lemna minor, L. gibba	Duckweeds	Lemna	In all drainage channels
Spirodela polyrhiza	Common duckweed	Spirodela	In Velipoja, Lezha, Roskoveci

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Table 2-8: Common plant species in the coastal wetlands and dunes.		
Scientific name	**Common name**	**Albanian name**
Ammophila arenaria	European beachgrass	Amofila ranore
Arthrocnemum spp.	Parish's glasswort	Artoknemi
Artemisia caerulescens	Blueish mugwort	Pelini i bruzte
Asphodelus aestivus	Summer asphodel	Badhra
Cakile maritima	European searocket	Brokra bregdetare
Ephedra distachya	Sea grape	Gjunjeza dykallinjshe
Juncus maritimus	Sea rush	Kulmaku bregdetar
Limonium vulgare	Sea lavender	Fshesa e rendomte
Schoenus nigricans	Black bogrush	Skeni zijosh
Salicornia europaea	Glasswort, pickleweed	Jambruku evropian
Sporobolus pungens	Dropseed grass	Sporobolus
Xanthium italicum	Cocklebur	Rodhja

Woodlands are prevalent in coastal lowlands close to freshwater habitats; they include alluvial forests, mixed forests, coastal pine forests and freshwater forests (Tab. 2-9). The oak belt extends above the shrubby zone with an upper altitude of 1200 m in the South, but descending gradually northwards to 700 m, with various deciduous trees and shrubs blended in (Tab. 2-10). The beech belt follows the oak belt at altitudes from 1700 to 2300 m. It is mainly composed of beech forests, cut in part by the valleys of the Shkumbini and Drini rivers.

Table 2-9: Common plant species in the woodlands.			
Scientific name	**Common name**	**Albanian name**	**Notes**
Alnus glutinosa	Common alder	Verriu i zi	
Fraxinus angustifolia	Narrow-leaved ash	Frasheri i zi	Freshwater woods
Pinus halepensis	Aleppo pine	Pisha e eger	In coastal pine forests
Pinus pinea	Stone pine	Pisha e bute, Vgjea	In coastal pine forests
Platanus orientalis	Oriental plane	Rrapi	In river beds
Populus alba	White poplar	Plepi i bardhe	Freshwater woods
Rosa sempervirens	Evergreen rose	Trendafili	
Salix fragilis, S. alba	Willows	Shelgje	Freshwater woods, in river beds
Tamarix parviflora *T. hampeana*	Small-flowered tamarisk	Marina	Freshwater woods, in river beds
Ulmus minor	Field elm	Vidhi	
Vitex agnus-castus	Chaste tree	Konopica	

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Table 2-10: Common plant species in the oak belt with deciduous trees and shrubs.

Scientific name	Common name	Albanian name	Notes
Acer obtusatum	Maple	Panja, Pafta	
Carpinus orientalis	Oriental hornbeam	Shkoza e zeze	
Castanea sativa	Sweet chestnut	Geshtenja	In Tropoja, Mati, Elbasani and Pogradeci
Celtis tournefortii var. *glabrata*	Smooth hackberry	Caraci	
Colutea arborescens	Bladder senna	Fshikekartha	
Cornus mas	Cornelian cherry	Thana	
Cornus sanguinea	Winter beauty	Thanukla	
Corylus avellana	Hazel	Lajthia	
Cotinus coggygria	Smoke tree	Cemerdelli	
Crataegus spp.	Hawthorn	Murrizi	
Erica herbacea	Winter heath	Grathata	
Euphorbia veneta	Vulfi spurge seeds	Qumeshtorja	
Forsythia europaea	Albanian forsythia	Boshtra, Fyshtra	Endemic in hilly zones
Fraxinus ornus	Flowering ash	Frasheri i bardhe	
Genista tinctoria	Dyer's broom	Gjineshtra ngjyruese	
Juniperus excelsa	Greek juniper	Dellinja greke	In Prespa watershed
Juniperus oxycedrus *Juniperus communis*	Juniper	Dellinja e kuqe, Dellinja e zeze	
Lilium candidum	Madonna lily	Zambaku bardhosh	
Ostrya carpinifolia	European hop-hornbeam	Melleza	
Paliurus spina-christi	Jerusalem thorn	Driza	
Prunus webbii	Vebbii almond	Bajamja e eger	
Quercus cerris	Turkey oak	Qarri	
Quercus frainetto	Hungarian oak	Sparthi	
Quercus petraea	Sessile oak	Bunga	
Quercus pubescens	Pubescent oak	Bungebuta, Lisi i bute	
Quercus troiana	Macedonian oak	Bulgri, Qarrziu	
Sorbus torminalis	Wild service tree	Mollevicja, Vodhevicja	

In the South beech is often replaced by pines. Local peculiarities in the beech belt are associations with the Bulgarian fir, *Abies borisi-regis*, which grow in the Southern mountainous region but are massively endangered due to over-harvesting, damage and destruction. In Valbona (Tropoja), associations of the Norway spruce, *Picea abies* with the common juniper, *Juniperus communis* are widespread. The upper elevation of the beech forest ends mostly with the Bosnian, *Pinus heldreichii* and the Macedonian pine, *Pinus peuce* (Tab. 2-11).

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Table 2-11: Common plant species in the beech belt.

Scientific name	Common name	Albanian name	Notes
Abies alba	Silver fir	Bredhi i bardhe	Grouped or solitary, but rarely forming real forests
Abies borisi-regis	Bulgarian fir	Bredhi bullgar	In the Southern mountains, endangered
Acer pseudoplatanus	Sycamore maple	Panja e malit	
Betula pendula	Silver birch	Meshtekna	In Kukesi,
Corylus avellana	Common hazel	Lajthia	In Northern Albania
Fagus sylvatica	Beech	Ahu	
Ilex aquifolium	European holly	Ashja	
Juniperus communis	Common juniper	Dellinja e zeze	
Ostrya carpinifolia	European hop-hornbeam	Melleza	
Picea abies	Norway spruce	Homoqi norvegjez	In Valbona
Pinus heldreichii	Bosnian pine	Arneni, Rrobulli	
Pinus mugo	Mountain pine	Kerleka	At higher altitudes in the Alps
Pinus nigra	European black pine	Pisha e zeze, Boriga	
Pinus peuce	Macedonian pine	Arneni i bardhe	At the upper limit of the beech forest
Pinus silvestris	Scotch pine	Hartina, Pisha e bardhe	In the Central Mountainous part
Rubus idaeaus	Raspberry	Mjedra	
Sorbus aucuparia	European rowan	Vodha e eger	
Tilia cordata (=*T. parvifolia*)	Small-leaved lime	Bliri gjethevogel	In forests and shrubs
Tilia platiphyllos	Large-leaved linden	Bliri gjethegjere	Rare in forests
Vaccinium myrtillus	European blueberry	Thrashegra, Mersine, Qershi toke, Boronica	

The belt of pastures and subalpine shrubs propagates in the highest regions of the territory at altitudes higher than 1700 to 1800 m with grasses and evergreen or deciduous shrubs (Tab. 2-12).

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Table 2-12: Belt of pastures and subalpine shrubs.		
Latin name	**Common name**	**Albanian name**
Carex spp.	Sedge	Presja
Daphne spp.	Spurge-laurel	Cercelja
Dryas octopetala	Driada	Driada
Genista spp.	Broom	Gjineshtra
Juniperus nana	Dwarf japgarden juniper	Dellinja e rregjuar
Pinus mugo - In the North	Dwarf mugo pine	Kerleka
Rosa spp.	Roses	Trendafile
Graminaceous plants:		
Agrostis capillaris	Common bent	Barimza kapilare
Festuca adamovici	Fescue	Bishtpeleza
Festuca bosniaca		Bishtpeleza boshnjake
Festuca panciciana	Fescue	Bishtpeleza
Festuca paniculata		
Koeleria eryostachia	Junegrass	Keleria
Koeleria splendens		
Nardus stricta	Nard grass	Xhufka
Phleum alpinum	Alpine timothy	Fleumi alpin
Poa alpina	Alpine meadow-grass	Flokesa alpine
Poa cenisae	Meadow-grass	Flokesa
Sesleria coerulans	Moorgrass	Pirregjakesja e kaltert
Sesleria tenerrima	Moorgrass	Pirregjakesja e bute
Trisetum flavescens	Golden oat grass	Triseti
Leguminosae:		
Anthyllis vulneraria	Woundwort	Antili sherues
Astragalus angustifolius	Milk-vetch, Goat's-thorn	Arithja gjethengushte
Onobrychis alba	Sainfoin	Esparseta e bardhe
Onobrychis montana	Sainfoin	Esparseta malore
Trifolium alpestre	Clover	Terfil mali
Trifolium badium		Terfili i murrme
Trifolium velenovski		Terfili i Velenovskit

Although Mediterranean shrubs and oak forests extend throughout the country even in the most populated areas, they have been seriously damaged in the past. Forests covered 46% of the territory in 1950, but only 35% by 1995. Large areas in hilly zones have been deforested and transformed for agricultural and horticultural purposes (vineyards, olive groves, plantations of citrus fruits, figs, pears, apples, nuts and chestnuts). Recently, even the beech and pine forests are overused and have become substantially degraded. As a consequence, the observed heavy erosion, due to the mountainous terrain and the climate, is exacerbated by improper human activities, by inappropriate land use practices such as deforestation, overgrazing and firing and by improper gravel dredging in the riverbeds.

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2.3. Botanical Garden of Tirana (BGT)

The BGT is a unique institution in Albania dealing with the ex situ conservation of Albanian flora, especially dealing with threatened, rare and endemic taxa. It was founded in 1971 and since then it is part of the Faculty of Natural Sciences at Tirana University, within the Research Centre of Flora and Fauna.

The BGT extends on a surface of nearly 15 ha and is located in the hilly slopes in the southern part of Tirana. About 1400 species or other taxonomic forms are sheltered there (Figs. 2-7 and 2-8).

Figure 2-7: Mustafa Demiri (1923 –1985), botanist and founder of the BGT.

Figure 2-8: Botanical Garden of Tirana (May 2006) (Photos: A. Miho).

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Its *Index Seminum* is regularly published; seeds and scientific information on the Albanian flora and vegetation are continuously exchanged throughout the world. The BGT acts also as an open laboratory for pupils and students as well as for visitors and amateurs interested in flora and vegetation.

2.4. Terrestrial fauna

The factors that create favorable conditions for plant diversity in Albania also determine the high level of faunal diversity in the country. Despite many existing specific studies the description of the terrestrial fauna is far from being complete. So far it includes 5500 animal species, of which about 4680 belong to invertebrates with more than 4000 insects, and there are about 800 species of vertebrates.

More than 90 globally threatened species of animals live in Albania, including 21 mammals, 18 birds, 4 reptiles, 2 amphibians, 28 fish species and 18 invertebrates. Among the endangered species some are of special concern, namely among the waterbirds the Dalmatian pelican (*Pelecanus crispus*; *see* Fig. 10-32) and the Pygmy cormorant (*Phalacrocorax pygmaeus*). Endangered fish species include the Ohrid trout (*Salmo letnica*), the sturgeon (*Acipenser sturio*) and the Brown trout (*Salmo trutta*; *see* Fig. 3-11). About 573 species of endangered, rare and endemic animal species, both invertebrates and vertebrates, are listed in Albania's Red Book (Misja, 2006). Moreover, 9 local breeds of goats and 5 breeds of sheep are documented for Albania.

Figure 2-9: Heldreichii lily (*Lilium chalcedonicum*), attended by a Mountain Apollo (*Parnassius apollo*) (Photo: L. Shuka).

Amphibians and reptiles have received relatively little scientific attention so far; some species of frogs, salamanders, lizards, snakes, turtles and tortoises are still quite abundant in Albania. Thirty-six reptile species have been identified. However, some species of amphibians are traditionally collected and even exported; moreover, illegal trading of turtles and tortoises is known to exist.

More than 320 species of birds roost within the Albanian territory, equal to more than 60% of the birds known for the whole European continent. About 200 of them nest and live within the country; the rest is migratory, crossing during summer from Northern Africa or during winter form the Central Europe. About 115 bird species belong to the endangered group, of which the number of populations is steadily decreasing; some species may have even reached a critical limit for their survival (Tab. 2-13; *see* also Figs. 7-25 and 10-36).

Terrestrial vertebrates have not been studied as well as plants or other animal groups in Albania. The mountains provide habitats for a number of large mammals. Most populations are relatively small and are scattered in remote mountain areas; they declined in numbers over the past two decades as the result of habitat degradation (deforestation) and hunting. The Wild boar (*Sus scrofa*) lives primarily in small populations in oak forests from 800 to 1000 meters a.s.l. The wolf is found throughout Albania except along the coast.

Recently (2012) experts have provided information about the presence of the Balkan Lynx (*Lynx lynx martinoi*) in Albania (in the Shebeniku-Jabllanica National Park) (Fig. 2-10). The European polecat (*Mustela putorius*) is sheltered in the central and northern part of Albania and in the coastal zone from Buna River to the Shkumbini River. The European rabbit (*Oryctolagus cuniculus*) is known to live only on Sazani Island (Vlora); the Forest dormouse (*Dryomys nitedula*) is reported to live in the beech forests of Librazhdi, Burreli and Peshkopi, while the Hazel dormouse (*Muscardinus avellanarius*) is observed only in Pishe-Poro (Vlora) and Vora (Tirana).

Table 2-13: Endangered birds (Misja, 2006).

Scientific name	Common name	Albanian name
Aquila chrysaetos	Eagle	Shqiponja, Shqipja e malit
Aquila clanga	Greater spotted eagle	Shqiponja e madhe e rosave
Aquila heliaca	Eagle	Shqiponja perandorake
Aquila pomarina	Lesser spotted eagle	Shqiponja e vogel e rosave
Aythya nyroca	Ferruginous duck	Kryekuqja e vogel
Branta ruficollis	Red-breasted goose	Pata e vogel laramane
Bubo bubo	Eurasian eagle owl	Kukuvajke
Burhinus oedicnemus	Stone curlew	Gjelaci symadh
Buteo lagopus	Rough-legged buzzard	Huta me kalca
Buteo rufinus	Long-legged buzzard	Huta, Petriti bishtbardhe
Ciconia ciconia	White stork	Lejleku i bardhe
Falco biarmicus	Lanner falcon	Fajkua, Skifteri mesdhetar
Falco cherrug	Saker falcon	Fajkua, Skifteri i gjuetise
Falco eleonorae	Eleonora's falcon	Fajkua, Skifteri mbretëror
Falco naumanni - primarily in the mountains and becoming rare	Falcon	Fajkua, Skifteri kthetraverdhe
Gallinago media	Great snipe	Shapke, Shaptore, Puledushke
Gypaetus barbatus	Bearded vulture	Shkaba mjekroshe
Gyps fulvus	Griffon vulture	Shkaba, Gabonja
Haliaetus albicilla	White-tailed eagle	Shqiponja, Shqipja e detit
Neophron percnopterus	Egyptian vulture	Kali i qyqes
Numenius tenuirostris	Slender-billed curlew	Kojliku sqepholle
Pelecanus crispus	Dalmatian pelican	Pelikani kacurel
Perdix perdix	Grey partridge	Thelleza
Phalacrocorax pygmaeus	Pygmy cormorant	Karabullaku
Phasianus colchicus	Common pheasant	Fazani
Tetrao urogallus	Capercaillie	Gjeli i eger

Table 2-10: The Association for Protection and Preservation of Natural Environment in Albania (PPNEA) have proved in 2012 about the presence of the Balkan Lynx in the Shebeniku-Jabllanica National Park (Photo: http://www.ppnea.org/lynx4.jpg).

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Table 2-14: Mammals (Misja, 2006; http://en.wikipedia.org/wiki/List_of_mammals_of_Albania).

Scientific name	Common name	Albanian name	Notes
Large mammals			
Ursus arctos	Brown bear	Ariu i murrme	Most populations small, scattered in remote mountain areas
Felis silvestris	Wild cat	Macja e eger	
Lynx lynx martinoi	Balkan Lynx	Rreqebulli	
Canis lupus	Wolf	Ujku	
Canis aureus	Jackal	Çakalli	
Capreolus capreolus	Roebuck	Kaprolli	
Dryomys nitedula	Forest dor mouse	Mi toke	In beech forests of Librazhdi, Burreli and Peshkopi
Lepus europaeus	Hare	Lepuri i murme	
Martes foina	Beech marten	Kunadhe, Shqarth	
Martes martes	Pine marten	Kunadhe, Shqarth	
Muscardinus avellanarius	Hazel dormouse	Mi toke	In Pishe-Poro and Vora
Mustela herminea	Stoat	Hermelin	
Mustela putorius	European polecat	Qelbes	In the central and northern part
Oryctolagus cuniculus	European rabbit	Lepur i bute	Sazani island
Rupicapra rupicapra	Wild goat	Dhi e eger	
Sus scrofa	Wild boar	Derr i eger	In oak forests
Vulpes vulpes	Red fox	Dhelper	
Small mammals			
Lutra lutra	European otter	Lunder, Vider	Endangered
Myocastor coypus	Nutria		A rodent native to South America
Myotis capaccinii	Long-fingered bat	Lakuriq nate	
Rhinolophus euryale	Mediterranean horseshoe bat	Lakuriq nate	

Small mammals are well represented in Albania, including many rodent species and members of the weasel family, such as the endangered European otter (*Lutra lutra*). The Nutria (*Myocastor coypus*), a rodent native to South America, is the only introduced mammal species known to have established a breeding population in Albania. Several bat species live in Albania's caves, including some rare species listed in the fauna Red Book (Misja, 2006) (Tab. 2-14).

2.5. Museum of Natural Sciences (MNS)

The MNS contains a rich and interesting collection of animals, plants, minerals and paleontological artifacts from Albania. The most interesting part is the zoological section, organized within seven pavilions. It hosts also exotic collections from Asia, Africa, Latin America, India and the Pacific Ocean including collections of mollusks, corals, tropical butterflies and birds (Figs. 2-11 and 4-22). The MNS offers good didactic possibilities for students of biological curricula and for school pupils, visitors and enthusiasts. A special pavilion dealing with environmental education has been opened recently.

Figure 2-11: 1: Prof. I. Haxhiu, former director of MNS, zoologist, expert of amphibians and reptilians; **2:** *Lynx lynx*; **3:** *Felis silvestris*; **4:** *Aquila chrysaetos* (Photos: I. Haxhiu and A. Miho).

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MNS has been founded in 1948, but the collection history is since 1900. Since 1957 it is part of the Faculty of Natural Sciences, at Tirana University, actually within the Research Centre of Flora and Fauna.

2.6. Nature protection in Albania

Despite economical and social difficulties, many efforts to face vaste environmental problems have been undertaken in Albania. In the new Constitution approved in 1998, it is stated that the preservation of a healthy environment is the basis for a sustainable development. The Committee of Environmental Protection was formed as a governmental body in 1991, transformed to the National Environmental Agency in 1998, and established in 2001 as the Ministry of Environment; today it is the Ministry of Environment, Forests and Water Administration (MoEFWA).

The Albanian National Environmental Action Plan (NEAP) was approved in 1993; it identifies the priorities for the monitoring of urban and industrial waters and the implementation of standards and measures to prevent erosion; it also addresses the restoration and rehabilitation of hot spots and their and environmental conservation and protection issues. Three laws : '*On the environmental protection*' (no. 10431), '*On the environmental impact assessment*' (no. 10440) and '*On the environmental permitting*' (no. 10448); they covers the full spectrum of environmental policy. The National Strategy and an Action Plan of Biodiversity was approved in 2000. Since 1991, Albania is a member of more than 13 international conventions and agreements dealing with environmental issues. A modern legal system is approved, covering nature protection, sustaining biodiversity and management of protected areas, including the transitional wetlands. The most important one is the law no. 8906, dated 06.06.2002, '*On the Protected Areas*'. Its application is enforced through several decisions by the Council of Ministers and other governmental regulators. In tables 5-7 and 5-8 principal environmental laws and other legal acts are listed that have an impact on nature protection and administration in Albania.

Responsible bodies for the management of natural resources including the transitional waters are summarized on table 5-9. The responsibility for the protection and management of protected areas are assigned to the Ministry of Environment, Forests and Water Administration, to the Regional Directorates of Environment, Forests and Pastures, and directly to the Administration of each protected area. However, the role of the local authorities is most crucial for the development and protection of each zone of interest.

Up to 2012, the total surface area of protected sites in Albania is more than 4340 km^2 (Tab. 2-15), equal to more than 15% of Albanian territory. About 30% of it belong to the coastal zone (*see* Tab. 5-4), where the 3 sites, Butrinti-Çuka-Stillo (Saranda), Karavasta-Divjaka (Lushnja) and Shkodra Lake-Buna River-Velipoja (Shkodra) are listed as Wetlands of International Importance (RAMSAR). Details are given in Chapter 5. The Albanian Government is seeking to extend the protected area to more than 5900 km^2 by the year 2015.

Table 2-15: Number of Albanian protected areas in 2012 (IUCN Category) (http://www.moe.gov.al/upload/zona%20te%20mbrojtura/RRJETI%20I%20ZONAVE%20TE%20MBROJTURA%20NE%20SHQIPERI - QERSHOR%20-12.pdf).

National Designations and IUCN category	Site number	Surface until year 2012, km^2
Strict Natural Reserve/Scientific Reserve (I)	2	48
National Parks (II)	15	1890
Natural Monuments (III)	750	35
Managed Nature Reserves / Natural Parks (IV)	22	1230
Protected Landscapes/Seascapes (V)	5	960
Protected Areas of Managed Resource (VI)	4	183
Total Protected Areas in Albania in 2012:	**798**	**4343**

Although a considerable part of the Albanian territory belongs officially to protected zones, real protection often does not take place due to increased human pressure by uncontrolled urbanization and the development of tourism. Water pollution, unauthorized waste deposition and disposal, deforestation, illegal and uncontrolled fishing and hunting also adversely impact on protected areas.

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Unfortunately, implementation of existing legislation continues to remain weak and insufficient. It is mainly dictated by the low level of economic activity, unclear land ownership issues and characterized by unsatisfactory inspection, control, monitoring and enforcement by governmental bodies, combined with low environmental education and awareness towards nature of the general public.

2.7. More information about the Albanian environment

More information about Albanian Environmental issues and about protected areas may be obtained from the following Albanian State bodies and from NGOs:

=>Ministry of Environment

Mailing address: Rr. Durresit, No. 27, Tirana, Albania.
Tel.: 00355.4.2224537; fax: 00355.4.2270627;
e-mail: info@moe.gov.al; website: http://www.moe.gov.al/

=>Specific Directorates at the MoEFWA:

-Directorate of Biodiversity; Tel.: 00355.4.2239849;

-Directorate of Water Resources and Fisheries; Tel.: 00355.4.2246171;

-Directorate of Forests and Pastures; Tel.: 00355.4.2222919;

-Directorate of Environmental Protection; Tel.: 00355.4.2224572;

-Directorate of Environmental Control; Tel.: 00355.4.2225068.

=>Albanian Country Office of the Regional Environmental Center for Central and Eastern Europe (REC). Mailing address: P.O.Box 127, Tirana, Albania. Visiting address: Rr. Ismail Qemali, No. 27, Tirana, Albania. Tel./Fax:: 00355.42.232928; e-mail: rec@albania.rec.org; website: http://albania.rec.org; http://www.mjedisisot.info.

=>World Database on Protected Areas. Websites: http://sea.unep-wcmc.org/wdbpa/; http://www.protectedplanet.net.